REMARKS

This Amendment is submitted in response to the non-final Office Action mailed on April 27, 2011. A petition for a one month extension of time ($130.00) is submitted herewith. The Director is authorized to charge $130.00 for the one-month extension of time, and any additional fees which may be required, or to credit any overpayment to Deposit Account No. 02-1818. If such a withdrawal is made, please indicate the Attorney Docket No. 3712174-00453 on the account statement.

Claims 1-4, 6-12 and 14-21 are pending in this application. Claims 5-6 and 13-14 were previously canceled without prejudice or disclaimer, and Claims 1 and 9 were previously withdrawn from consideration. In the Office Action, Claims 2-4, 7-8, 10-12 and 15-21 are rejected under 35 U.S.C. §103. In response, Claims 22-23 have been newly added. The amendments do not add new matter. The new claims do not add new matter. In view of the amendments and/or for at least the reasons set forth below, Applicants respectfully submit that the rejections should be withdrawn.

In the Office Action, Claims 2-4, 7-8, 10-12 and 15-21 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Publication No. 2002/0117469 A1 to Jito et al ("*Jito*") in view of U.S. Patent No. 5,436,091 to Shackle et al. ("*Shackle*"). For at least the reasons set forth below, Applicants respectfully submit that the cited references are deficient with respect to independent Claims 2 and 10 and Claims 3-4, 7-8, 11-12 and 15-21 that depend therefrom.

Independent Claims 2 and 10 recite, in part, an anode including an anode current collector having a projection formed on a substrate; and an anode active material layer being formed on and covering the anode current collector and projection through at least one method selected from the group consisting of a vapor deposition method, a liquid-phase deposition method and a sintering method, and including at least one material selected from the group consisting of silicon (Si) and silicon compounds, wherein an average diameter of the projection ranges from about 3 μm to about 10 μm, and wherein the projection includes an element capable of being alloyed with the anode active material layer. By forming the claimed projection on the anode current collector, adhesion between the active material and the current collector may be improved, thereby preventing the anode active material layer from falling off or cracking during charge and discharge. See, Specification, page 1, paragraphs 5 and 11-12; pages 1-2, paragraph

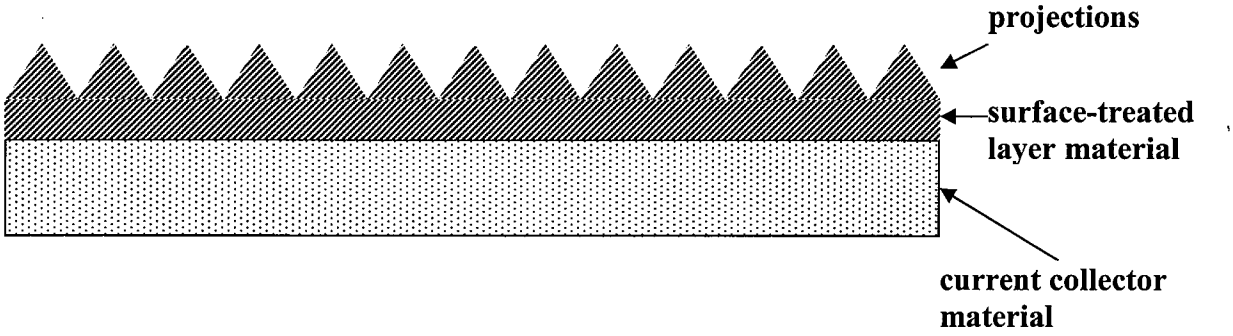
13; page 2, paragraph 20; page 4, paragraph 38. In contrast, the cited references are deficient with respect to the present claims.

For example, even if combinable, *Jito* and *Shackle* fail to disclose or suggest an anode current collector having a projection formed on a substrate, wherein the projection includes an element capable of being alloyed with the anode active material layer as required, in part, by independent Claims 2 and 10. The Patent Office asserts that the etching on *Jito*'s surface meets the claimed "projection" limitation. See, Office Action, page 7, lines 18-19. The Patent Office further asserts that the alleged "projection" of *Jito* includes an element capable of being alloyed with the anode active material layer because the current collector is made of copper. See, Office Action, page 3, lines 13-15.

However, *Jito* merely teaches forming a surface treatment layer or oxide layer on an anode current collector material and then etching the surface treatment layer or oxide layer to remove some of that layer. See, *Jito*, page 1, paragraphs 9-10 and 14; page 2, paragraphs 24-25; Table 1. In fact, *Jito* expressly states that "it is preferable to ***control the etching degree of the surface-treated layer*** so as to improve the diffusion of the current collector material into the thin film." See, *Jito*, pages 1-2, paragraph 15 (emphasis added). Nowhere does *Jito* teach or suggest etching the current collector material itself, rather than the surface treatment or oxide layer formed on the surface of the current collector material. As such, one of ordinary skill in the art would understand that if any "projections" are formed by etching, the projections would be formed of the same material as the surface treatment layer or oxide layer. *Jito* teaches that the surface treatment layer includes materials for chromate treatment, silane coupling treatment or benzotriazol treatment, and the oxide layer is formed of an oxide film. See, *Jito*, page 1, paragraphs 12-14; page 2, paragraphs 24-25. Nowhere does *Jito* teach that its surface treatment or oxide layer includes an element capable of being alloyed with the anode active material layer.

In response to Applicants' arguments, the Patent Office asserts that *Jito* discloses "removing at least part of the surface-treated layer by etching the surface of the current collector with an ion beam or plasma in order to improve the diffusion of the current collector material into the thin film." See, Office Action, page 7, lines 8-10 (emphasis added). However, Applicants respectfully note that the portion of *Jito* cited by the Patent Office also teaches that the "current collector" being etched is one in which a surface-treated layer is formed. See, *Jito*, page 1, paragraph 10. As such, etching the surface of the current collector to remove part of the surface-treated layer is equivalent to etching only the surface-treated layer, rather than the

current collector material itself (e.g., the metallic foil). As shown in the illustration below, this would result in any alleged "projections" being formed of the surface-treated layer material:



The Patent Office relies on *Shackle* merely for the disclosure of a microroughened surface having irregularities protruding from the surface by a distance of 0.1-10 μm. See, Office Action, page 3, lines 6-8. Nowhere does *Shackle* disclose or even suggest a projection formed on an anode current collector and including an element capable of being alloyed with the anode active material layer. In fact, *Shackle* merely teaches an alkali metal anode layer 18 coated onto an electrolyte 16 and fails to even contemplate an anode current collector or forming a projection on an anode current collector. Therefore, even if combinable, *Jito* and *Shackle* fail to disclose or suggest an anode current collector having a projection formed on a substrate, wherein the projection includes an element capable of being alloyed with the anode active material layer in accordance with independent Claims 2 and 10.

Moreover, Applicants respectfully submit that, even if combinable, *Jito* and *Shackle* fail to render obvious a projection having an average diameter of about 3 μm to about 10 μm. The Patent Office asserts that *Shackle* teaches irregularities that protrude from a surface by a distance of 0.03 μm to 500 μm and, thus, it would have been obvious to modify the size of the protrusion to arrive at the claimed range. See, Office Action, page 5, lines 4-22; page 6, lines 1-5. However, contrary to the Patent Office's assertion, a projection having the claimed average diameter would not have been obvious based on the teachings of *Shackle* because the Specification demonstrates unexpected results in the claimed range. In addition, even if *Shackle* were broadly construed to disclose projections having an average diameter of 0.03 μm to 100 μm, the claimed range would not have been obvious because the narrower claimed range achieves unexpected results over values outside that range. "Applicant can rebut a presumption of obviousness based on a claimed invention that falls within a prior art range by showing. . .

'that there are new and unexpected results relative to the prior art.'" M.P.E.P. §2144.05 (III) (2010).

For example, Table 3 demonstrates that the capacity retention ratio of the battery is merely 71% when the average diameter of the projection is 0.5 μm. See, Specification, Table 3. In contrast, when the average diameter of the projection is increased to 1 μm, the capacity retention ratio increases significantly to 83%. See, Specification, Table 3. Similarly, Table 3 demonstrates that the capacity retention ratio of the battery is 83% when the average diameter of the projection is 10 μm. See, Specification, Table 3. However, when the average diameter of the projection is increased beyond the claimed range to 20 μm, the capacity retention ratio decreases to 78%. See, Specification, Table 3. The prior art range of *Shackle* is between 0.03 μm and 500 μm, which encompasses a large range of values outside the claimed range. See, *Shackle*, column 4, lines 61-68; column 5, lines 1-2. As such, the Specification demonstrates unexpected results within the claimed range as compared with the prior art range of *Shackle* and, even if combinable, *Jito* and *Shackle* fail to disclose or render obvious an anode current collector having a projection formed on a substrate, wherein an average diameter of the projection ranges from about 3 μm to about 10 μm as required, in part by the present claims.

With respect to Claims 8 and 16, Applicants respectfully submit that, even if combinable, *Jito* and *Shackle* fail to disclose an anode wherein the anode active material layer is alloyed with the projection in at least a portion of an interface with the projection. The Patent Office asserts that "the active material [of *Jito*] forms an alloy with the current collector because the current collector is made of copper." See, Office Action, page 7, lines 19-20. However, contrary to the Patent Office's assertion, *Jito* teaches that if copper is excessively diffused into a silicon thin film, "an intermetallic compound is formed which may decrease the adhesion of the silicon thin film to the copper foil." See, *Jito*, pages 1-2, paragraph 15. Therefore, *Jito* discloses that "it is preferable to control the etching degree of the surface-treated layer so as to improve the diffusion of the current collector material into the thin film within the range that ***the intermetallic compound of the active material and the current collector material is not formed***." See, *Jito*, pages 1-2, paragraph 15 (emphasis added). One of ordinary skill in the art would thus understand that *Jito* teaches etching its surface-treated layer such that the active material and current collector material ***are not alloyed***. Thus even if combinable, *Jito* and *Shackle* fail to disclose an anode wherein the anode active material layer is alloyed with the projection in at least a portion of an interface with the projection in accordance with Claims 8 and 16.

Accordingly, Applicants respectfully request that the rejection of Claims 2-4, 7-8, 10-12 and 15-21 under 35 U.S.C. §103(a) to *Jito* and *Shackle* be withdrawn.

Applicants further note that Claims 22-23 have been newly added. The new Claims are fully supported in the Specification at, for example, page 2, paragraph 22; page 5, paragraphs 55 and 57; page 6, paragraph 63; page 7, paragraph 65; pages 7-8, paragraph 67; page 8, paragraph 68; Tables 1-4. No new matter has been added thereby. Applicants respectfully submit that the subject matter as defined in the newly added claims is patentable over the cited art for at least substantially the same reasons discussed above.

For the foregoing reasons, Applicants respectfully submit that the present application is in condition for allowance and earnestly solicit reconsideration of same.

Respectfully submitted,

K&L GATES LLP

BY _____

Thomas C. Basso
Reg. No. 46,541
Customer No. 29175

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